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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/628,924	07/28/2003	Yoshihiro Kawamura	03448/LH	7696

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EXAMINER

BHAT, NINA NMN

ART UNIT	PAPER NUMBER
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1764

DATE MAILED: 04/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/628,924

Applicant(s)

KAWAMURA ET AL.

Examiner

N. Bhat

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 28 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

### DETAILED ACTION

1. The disclosure is objected to because of the following informalities: In the specification, Page 5, line 25, applicant should correct the heading to read as follows; -- Brief Description of the Drawings-- Appropriate correction is required.
2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-22 are rejected under 35 U.S.C. 102(b) as being anticipated by Shioya et al. PGPUB US 2002/0094462.

Shioya et al. PGPUB US 2002/0094462 teach providing a compact reactor/fuel cell/power generator which includes a fuel reforming portion, water gas shift reaction, which is shown in Figure 5, where fuel reforming takes place in portion 16(a) specifically 160X, also included is the water gas shift reaction portion depicted as 160Y and where selective oxidation reaction takes place in portion 160Z. [Note Paragraphs 0258-0263] Shioya et al. teach that as shown in figure 34, The reactor or structures are constituted in a small space by using microchanneling techniques to provide a substrate which extends along the circumference side surfaces of a cylinder shape; the vapor reforming reaction portion 160X to which a heater for heating fuel, disposed in the flow path having a depth and width not more than 500 microns having particular flow path respectively. The selective oxidation reaction portion has a flow path width and depth not more than 500 microns. The substrate are provided to have a predetermined groove

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shape and predetermined flat surface pattern on one surface side of a small substrate 161 of silicon by using the microfabrication techniques similar to that used in semiconductor manufacture. The vapor forming reaction portion 160X includes a thin film heater (166) which is an area corresponding to an area in which the reforming reaction flow path (164) is formed and provided on the other surface side of the substrate (161). Within the grooves as claimed is catalyst material for catalyzing the reforming, water-gas shift reaction and selective oxidation reactions.[Note Paragraphs [0259 - 0271]] Because of the shape and discussion of Shioya et al. cylindrical shape and substrate surface, it would be inherent in Shioya et al. to provide a second substrate having a surface which contacts the first surface of the first substrate and concave portion which is capable of receiving a catalyst layer.

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jankowski et al. US2003/0138685.

Jankowski et al. teach the invention substantially as claimed by providing a MEMs (micro-electro-mechanical system) thin film fuel cell which has the same physical arrangement as applicant's compact chemical reactor having a first substrate having a first surface and a groove or channel formed therein; a catalyst provided on an inner surface of the groove, and a second substrate having a surface which contacts the first

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substrate. Specifically this is taught in Jankowski et al. is providing a MEMS based thin film fuel cell or stack, which includes manifolds and micro flow channels formed in the structure/substrate. The host substrate is fabricated based on yttria stabilized zirconia, nickel, and silver trilayer structure. The microflow channels and manifolds can be made by micromachining techniques. Jankowski teach that substrates 11, 14 and 15 as shown in Figure 3 may be composed of silicon, glass, ceramic plastic or any other material which has sufficient mechanical strength and can withstand the temperature of operation and can be micromachined or cast to form manifold channels.[Note Paragraphs [0026]-[0029]] Jankowski et al. teach that the fuel cell includes a silicon substrate which includes channels, inlets and outlets with approximately 50 microns by 200 microns openings for fuel delivery. Specifically Jankowski in Figure 5, teaches a fuel cell stack which includes a micromachined host structure or substrate 61, a micromachined substrate(62) bonded to substrate (61) at (63) a porous thick-film 64 located on the top surface of substrate (61). The microchannels as described by Jankowski can include catalyst material as well as including thin film heater [Note paragraph 0046, last three lines] as claimed by applicant.

However, Jankowski does not specifically teach a concave portion wherein the width of the concave portion is set to be 105% or more larger than a width of the groove.

Jankowski teaches method and means for providing pores and/or grooves using etching, micromachining or photolithographic techniques to provide grooves or channels of fluid pathways or manifolds within a host substrate. To provide the flow changes

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which include a concave portioning which are sized and shaped to a desired width as claimed by applicant would have been obvious to one having ordinary skill in the art from reading Jankowski and it is maintained that Jankowski renders applicant's invention as a whole obvious to one having ordinary skill in the art at the time the invention was made.

6. Claims 1-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gardner et al.

Gardner et al. teach a microcombustor which reads on applicant's chemical reactor comprising a first substrate and groove formed therein a catalyst layer providing on the inner surface of the groove and a second substrate having a surface which contacts the first substrate. The microcombustor comprises a thin film heater and a thermal sensor, which is supported on a membrane disposed on a substrate.

Specifically the substrate used to form the microcombustor (100) generally comprises a semiconductor silicon or gallium arsenic or dielectric glass, quartz, fused silica, a plastic with a thickness generally about 400-500 microns. The membrane is formed as rectangle or polygon. The suspended membrane (120) is supported by its edges to the substrate (130). Grooves or channels are patterned on the membrane/substrate by etching. A resistive heating element (160) is patterned on the upper side of the membrane and/or can be patterned on the underside of the membrane. [Note Column 5, lines 36-67 and Column 6, lines 12-35] The thin film platinum used as a heating element (160) can have dual functionality as the heater as well as the catalyst for supporting the combustion reaction. The catalyst can also be supported on alumina

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matrix, semiconducting oxides, zirconia etc. The supported catalyst (110) can be disposed on the surface of the heated membrane or disposed in the grooves or channels contained within the microcombustor.

However, Gardner et al. do not specifically teach a concave portion wherein the width of the concave portion is set to be 105% or more larger than a width of the groove.

Gardner et al. teaches method and means for providing grooves using etching, micromachining or photolithographic techniques to provide grooves or channels of fluid pathways or manifolds within a host substrate. To provide or optimize the flow channels or grooves which include a concave portion which has been sized and shaped to a desired width as claimed by applicant would have been obvious to one having ordinary skill in the art from reading Gardner and it is maintained that Gardner renders applicant's invention as a whole obvious to one having ordinary skill in the art at the time the invention was made.

7. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to

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be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

8. Claims 1-22 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-27 of copending Application No. 10/634,380. Although the conflicting claims are not identical, they are not patentably distinct from each other because both invention claim a compact chemical reactor which include first and second substrates, a microflow path or groove disposed between the first and second substrate and a thin film heater provided within the flow path and a catalyst layer provided on the surface of the first substrate. In the instant application applicant further recites that the groove includes a concave portion formed in the surface to receive a portion of catalyst layer. It would have been obvious from the claim recited in 10/634,380 that a concave portion containing a catalyst can read on the catalyst layer provided in the flow path or groove disposed on the first substrate although not specifically recited as concave the claims of the '380 application are broader and can read on including a concave portion given its broadest most reasonable interpretation and therefore to machine the groove so that the inner surface has a concave portion would render the inventions obvious to one having ordinary skill in the art at the time the invention was made.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.



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9. Claims 1-22 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-27 of copending Application No 10/479,009. Although the conflicting claims are not identical, they are not patentably distinct from each other because both inventions claim an apparatus which includes a solid body in which a reaction flow path is formed, a heating element which includes a thin film heater formed on the body of the reactor, the flow path also includes a catalyst layer formed in at least a portion of the reaction flow path. The only difference between the instant invention and that of the '009 application is that the instant invention recites that the flow path or groove includes a concave portion wherein the catalyst is disposed within this concave portion. It would have been obvious to one having ordinary skill in the art that the flow path as claimed in the '009 application is broader in scope than that claimed in the instant application and to include a concave portion where the flow path having any shape or configuration would have been obvious to one having ordinary skill in the art at the time the invention was made absent criticality in showing.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Schuessler et al. teach a reformation reactor. Tonkovich et al. teach an active micro channel heat exchanger. Autenrieth et al. teach a system for water vapor reforming of a hydrocarbon in a modular compact plate stack reactor.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to N. Bhat whose telephone number is 571-272-1397. The examiner can normally be reached on Monday-Friday, 9:30AM-6:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



N. Bhat  
Primary Examiner  
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